

of the typhoon encountered by the German bark *Fulda*. This vessel, on the 16th, in 10° N., 132° W., had barometer 29.75, with SW'yly winds, which latter prevailed, with increasing energy and gradually decreasing pressure until the 18th, when she crossed the track of the typhoon, the lowest barometer 28.76, occurring at noon in 14° N., 132° W.; after this, the vessel apparently kept to the eastward of the centre. On the 23rd, the storm curved towards the northeast and passed, during the 24th and 25th eastward to the south of Japan, the minimum barometric reading at Tokio, (29.67,) occurring at 3:30 p. m. of the latter date. Nos. XXVIII and XXX were described in the April REVIEW as areas No. XII and XIII. They entered the United States from the Pacific Ocean on the 17th and 19th, respectively, and having moved eastward to the eastern slope of the Rocky Mountains united on the 22nd, formed one area of low pressure, which, being opposed by high barometer to the east of the Mississippi, afterwards moved northeastwards towards Hudson's Bay, the lowest pressure at Moose Factory occurring on the morning of the 25th. No. XXIX moved from the interior of China to Japan, from the 18th to the 20th, the lowest barometer at Pekin (29.72) occurring about 8:15 p. m. of the 18th; at Vladivostock (29.63) about 9:30 p. m. of the 19th, with wind SE. 45 miles per hour, and at Tokio (29.46) at 3:30 a. m. of the 20th. Heavy rains fell at Nagasaki (1.42) and Tokio (1.11 inches.) No. XXXI passed eastward over Behring's Sea on the 22nd and 23rd, the lowest barometer at St. Paul's (29.63) occurring at 9 p. m. of the former, and at St. Michael's (29.48) at 1 a. m. of the latter date. It was accompanied by severe southerly gales, the wind at St. Paul's attaining a velocity of SW. 40, and at St. Michael's SW. 78 miles per hour; at Unalaska southerly winds and high temperatures continued from the 22nd to the 27th. No. XXXII, probably a branch of No. XXVII, moved northeastward during the 23rd and 24th, over the Sea of Japan. No. XXXIII developed over southern Europe on the 23rd in the south quadrant of area No. XXII and moved northeastwardly into central Siberia by the 29th; it was attended by heavy rains in southwestern Europe. No. XXXIV apparently originated over the Atlantic on the 23rd in the extensive depression left by area No. XXIII and passed slowly eastward, accompanied by strong westerly gales on its southern margin; on the 26th it moved southeastward to France and thence over central Europe as a well-marked storm. No. XXXV is described in the April REVIEW as area No. XV. No. XXXVI.—From the 23rd to the 26th very stormy weather prevailed to the south of Nova Scotia and Newfoundland, and an area of low barometer appears to have moved thence northeastward towards Iceland during the succeeding days of April. No. XXXVII moved eastward over the northern half of the United States from the 28th to the 30th and, has already been described as area No. XVI of the April REVIEW.

TEMPERATURE OF THE AIR.

The mean temperature of the air for December, 1880, is indicated by isotherms (in red) on chart No. II. The table of temperatures on that chart shows (as deduced from Signal Service observations of the past nine years) the mean temperatures for the various districts, and the departures from such means during December, 1880. As will be observed from that table, the mean in every district east of the Rocky Mountains has been below the normal. Over the country to the westward, the temperature has been slightly above the normal, except at Portland, Oregon, where a deficiency of $2^{\circ}.2$ prevailed. The temperature has been deficient 5° or more over the entire Missouri, Ohio and Upper Mississippi valleys, the Lake region (except northeastern New York), the Middle States, Tennessee and North Carolina. From the Upper Missouri valley deficiencies are reported, ranging from 10.5° at Bismarck to $13^{\circ}.5$ at Ft. Buford and 18° at Ft. Shaw. During the past ten years, lower mean temperatures, during December occurred generally east of the Missouri valley in 1872 and 1876—also in 1878 over the Gulf States and in 1879, over the Missouri valley. At Baltimore and Washington alone, have the lowest mean temperatures of the past decade occurred. The following deviations at detached stations not included in the districts, are noted: Mount Washington, $-0^{\circ}.3$; Pike's Peak, $+1^{\circ}.5$; Key West, $-2^{\circ}.9$; Punta Rasa, $-2^{\circ}.0$. The following are extracts from reports of voluntary observers: *Kansas*: Lawrence, mean $3^{\circ}.05$ below that of past twelve years. Holton, month unusually cold. *Maine*: Gardiner, month remarkable not for its extreme cold but for its uniformity of temperature; mean temperature for past 45 years, $22^{\circ}.10$, for December, 1880, $0^{\circ}.25$ below. *Maryland*: Fallston, mean lowest in past ten years, except December, 1876. *Nebraska*: Genoa, month very cold. *New Hampshire*: Lake Village, Lake Winnepiseogee closed by ice on the 24th; one to two weeks earlier than usual. Contoocookville, mean 2° below that of ten years. *New Jersey*: Newark, mean $7^{\circ}.2$ below the average of 35 years; the last decade of the month lower by 12° than such average. *New York*: North Volney, mean 4.85° below that of December for past ten years. Friendship, coldest weather for years. Hector, month unusually cold. *Ohio*: Hudson, month remarkably cold. *Pennsylvania*: Wellsboro, mean lowest for past ten years; during the last four days of the month the temperature ranged lower than in any preceding December for twenty years. *Virginia*: Dover Mines, mean $13^{\circ}.1$ lower than in 1879. Wytheville, month very cold. *West Virginia*: Helvetia, coldest in five years. Wellsburg, coldest for many years.

Maximum and Minimum Temperatures.—Maximum temperatures exceeding 80° , have occurred only in the interior of Texas and at Key West; under 40° only in Minnesota and the Lake Superior region. The lowest maximum 36° , was observed at Duluth on the 14th and the highest, 87° at Key West on the 18th. The temperature of 58° was noted at Ft. Benton on the 11th, and of 60° at Ft.

Keogh on the 12th.. The minimum temperatures reported from Signal Service Stations for December, 1880, were remarkably low. They were at many stations the lowest on record, and as a whole, were the most remarkable since 1835 throughout the whole country east of the Rocky Mountains, except in New England. The zero isotherm of minimum temperatures, quitting the New Jersey coast north of Cape May, ran southwestward through eastern Virginia to the northeastern part of South Carolina, thence nearly due west to Fort Sill in Indian Territory, and southwestward to the valley of the Rio Grande in Texas, and following that valley up its full extent, reached the northern boundary of the United States along the western edge of the Rocky Mountain range. The isotherm of minimum temperatures of -20° ran southward along the western shore of Lake Michigan to Milwaukee, westward to Yankton, and after a southward curve, which included North Platte and Cheyenne, followed the Rocky Mountain range to the British possessions. Temperatures of -40° and below, occurred as follows: Ft. Benton, 29th, -59° , 30th, -56° ; Ft. Garry, 27th, -40° , 28th, -44° ; Ft. Custer and St. Vincent, 23th, -42° ; Ft. Assiniboine, 29th, -42° ; Ft. Shaw, 29th, -42° ; 30th, -40° ; Helena, 30th, -40° ; Ft. Stevenson (medical department), 28th, -45° (Signal Service -26°). Minimum temperatures of the month exceeding 28° , were reported only from California and southern Florida. The following comparisons and notes are of interest: Washington, D. C., -13° , the lowest on record in Dec., being 3° below that of 1835. *Alabama*: Mobile, 30th, 14° , lowest since Signal station was opened, (1871;) many domestic animals killed by cold. Montgomery, 30th, 8° , lowest since Signal station was opened, (1871.) *Florida*: Pensacola, 30th, coldest weather ever remembered. Jacksonville, 30th, coldest weather since 1857; 19° ; oranges on the trees in the city frozen. *Georgia*: Gainesville, -4° , coldest since 1835. Forsyth, 30th, 4° , lowest in middle Georgia since February 8th, 1835. Minimum temperatures at Eatonton -3° and at Milledgeville -8° . Atlanta, 30th, 1° (Department of Agriculture -1°), said to be the coldest for 25 years. Augusta, 30th, 7° , coldest since Signal station was opened (1871), and probably for 25 years; next coldest, January 19th, 1873. 15° . Columbus, 4° ; on Alabama Hills, zero, coldest on record. *Kansas*: Independence, 29th, coldest ever known. *Maryland*: Fallston, -12° , lowest on record (16 past years); at Hollingsworth Mills, 290 feet lower, -21° , on the morning of the 31st. Cumberland, -10° , lowest temperature on record (nine preceding years). Sandy Springs, coldest ever experienced; near Pikesville it reached -20° , at Ellicott City -21° , and at Ryder's Station -24° . Baltimore, 30th, coldest since 1874. *Michigan*: Alpena, lowest December temperature since station was opened, (1873.) Coldwater, city thermometer registered -27° . Thornville, coldest for many years. *Missouri*: The Missouri Weather Service says: "The lowest temperature in the State was at Sedalia, -24° ." St. Louis, 29th, -15° , coldest in office (Signal Service) records. *New Hampshire*: Contoocookville, -8° ; temperatures ranging from -20° to -23° reported from other parts of the village. *New Jersey*: Newark, 30th, $-6^{\circ}.5$, coldest in a record covering past 37 years, except in December, 1851, when it was $-7^{\circ}.5$; minimum reported by another observer, -11° on the 31st. Freehold, coldest day in many years. Linden, lowest temperature in many years. *New Mexico*: Silver City, 31st, -7° , coldest ever known. *New York*: White Plains -14° ; in 1865, -18° . *North Carolina*: Lenoir, 30th, coldest ever known. Weldon, 31st, -5° coldest on record, (10 years.) Portsmouth, 30th, 15° , coldest for many years. *Pennsylvania*: Dyberry, minimum -19° ; 30th, mean temperature $-4^{\circ}.8$, coldest since January 8th, 1866, when the mean was $-12^{\circ}.0$. Pittsburg, 30th, -9° , lowest December temperature ever recorded. *South Carolina*: Aiken, 3° , lowest ever recorded; next coldest, 10° , December, 1870. Charleston, 30th, coldest since opening of station (1871); city records do not show so low a temperature since 1835. *Tennessee*: Memphis, 29th, 3° , coldest on record, except Dec. 2nd and Jan. 6th, 1875, when the same temperature was recorded. Knoxville, 30th, -5° , lowest since 1877. Chattanooga, 30th, -3° . *Texas*: Melissa, 29th, -6° , coldest in many years. Corpus Christi, 19° , coldest in many years. San Antonio, 29th, 10° , coldest ever known. Indianola, 29th, 14° , coldest ever known. *Virginia*: Dover Mines, 31st, -16° , coldest ever known. Dover, Loudon county, 31st, -34° , lowest ever known. Accotink, -15° ; in valley to east of station and 100 feet lower, -28° . Wytheville, -10° , coldest since 1868, when the same temperature was recorded. Richmond, -8° at sunrise. Cape Henry, 29th, coldest day since 1857. Danville, 30th, -12° , coldest ever known. Lynchburg, zero, lowest since station opened in 1872. *West Virginia*: Helvetia, 30th, -13° ; on hill 200 feet higher, -16° .

The following are the maximum and minimum temperatures reported in each State and Territory:

Maximum Temperatures.—*Alabama*: 77° at Mobile and Montgomery. *Arizona*: 80° at Tucson. *Arkansas*: 74° at Little Rock and *Mt. Ida. *California*: 80° at Los Angeles. *Colorado*: 65° at *Trinidad and 61° at Denver. *Connecticut*: 50° at New Haven and New London. *Dakota*: 58° at Deadwood. *Delaware*: 60° at Delaware Breakwater. *District of Columbia*: 54° at Washington. *Florida*: 87° at Key West. *Georgia*: 79° at *Thomasville and 77° at Savannah and Augusta. *Iowa*: 55° at Keokuk. *Idaho*: 52° at Boise City. *Illinois*: 69° at Cairo. *Indiana*: 59° at *New Harmony and 56° at Indianapolis. *Indian Territory*: 77° at Ft. Sill. *Kansas*: 68° at *Emporia and 62° at Dodge City. *Kentucky*: 63° at Louisville. *Louisiana*: 80° at *Lake Charles and 78° at New Orleans. *Maine*: 46° at *Gardiner and 44° at Portland. *Maryland*: 59° at *Deer Park and 56° at Baltimore. *Massachusetts*: 51° at Wood's Holl. *Michigan*: 50° at Port Huron and Alpena. *Minnesota*: 40° at Minneapolis and 38° at St. Paul. *Mississippi*: 78° at Vicksburg. *Missouri*: 64° at St. Louis, *Pierce City and *Warrenton. *Montana*: 60° at Ft. Custer. *Nebraska*: 65° at *Ft. Niobrara and 58° at

North Platte. *Nevada*: 55° at Pioche. *New Hampshire*: 42° at *Contoocookville and 31° on summit of Mount Washington. *New Jersey*: 55° at Cape May. *New Mexico*: 72° at La Mesilla. *New York*: 56° at *Ft. Niagara and 53° at Rochester. *North Carolina*: 77° at Wilmington. *Ohio*: 66° at *Portsmouth and 60° at Cleveland and Cincinnati. *Oregon*: 65° at Roseburg. *Pennsylvania*: 69° at Pittsburgh. *Rhode Island*: 50° at Newport. *South Carolina*: 73° at Charleston. *Tennessee*: 71° at Memphis. *Texas*: 94° at *Ft. Ringgold and 88° at Rio Grande City. *Utah*: 49° at Salt Lake City. *Vermont*: 43° at *Windsor and *Woodstock, and 41° at Burlington. *Virginia*: 71° at Cape Henry. *Washington Territory*: 60° at *Bainbridge Island and 51° at Olympia. *West Virginia*: 67° at Morgantown. *Wisconsin*: 44° at Milwaukee. *Wyoming*: 60° at Cheyenne.

Those marked with a star (*) are reported by U. S. Army Post Surgeons or Voluntary Observers.

Minimum Temperatures.—*Alabama*: 4° at *Green Springs and 8° at Montgomery. *Arizona*: 11° at Apache and Prescott. *Arkansas*: 0° at *Mt. Ida and 6° at Little Rock. *California*: 25° at Campo. *Colorado*: 21° at *Ft. Collins and —15° on summit of Pike's Peak. *Connecticut*: —10° at *Mystic and —4° at New Haven. *Dakota*: —45° at *Ft. Stevenson and —38° at Ft. Buford. *Delaware*: 1° at Delaware Breakwater. *District of Columbia*: —13° at Washington; *Distributing Reservoir, —15°. *Florida*: 17° at Pensacola. *Georgia*: —8° at *Milledgeville and 1° at Atlanta. *Iowa*: —25° at *Cresco and —19° at Dubuque. *Idaho*: 8° at *Ft. Hall and 19° at Boise City. *Illinois*: —25° at *Sterling and —19° at Champaign. *Indiana*: —19° at *Wabash and —18° at Logansport. *Indian Territory*: —3° at Ft. Gibson. *Kansas*: —22° at *Topeka and —14° at Leavenworth and Dodge City. *Kentucky*: —7° at Louisville. *Louisiana*: 10° at Shreveport. *Maine*: —11° at *Gardiner and —1° at Portland. *Maryland*: —19° at *Emmitsburg and —3° at Baltimore. *Massachusetts*: —10° at *Rowe and *South Lee, and —7° at Thatcher's Island. *Michigan*: —23° at Escanaba. *Minnesota*: —42° at St. Vincent. *Mississippi*: 11° at *Fayette and 12° at Vicksburg. *Missouri*: —24° at *Sedalia and —15° at St. Louis. *Montana*: —59° at Ft. Benton. *Nebraska*: —26° at North Platte. *Nevada*: 12° at Pioche. *New Hampshire*: —28° on summit of Mt. Washington and —10° at *Grafton. *New Jersey*: —18° at *Linden and —7° at Atlantic City and Barnegat. *New Mexico*: —4° at *Ft. Union and —3° at Santa Fe. *New York*: —30° at *Madison Barracks and —9° at Buffalo. *North Carolina*: —16° at *Lenoir and —5° at Charlotte. *Ohio*: —16° at *Westerville and *Jacksonburg, and —13° at Sandusky. *Oregon*: 18° at *Eola and 19° at Portland. *Pennsylvania*: —19° at *Dyberry and —9° at Pittsburgh. *Rhode Island*: 2° at Newport. *South Carolina*: 3° at *Aiken and 13° at Charleston. *Tennessee*: —5° at Knoxville. *Texas*: —3° at Ft. Elliott. *Utah*: 15° at *Ft. Douglass and 17° at Salt Lake City. *Vermont*: —19° at *Woodstock and —7° at Burlington. *Virginia*: —34° at *Dover and —11° at Ft. Whipple. *Washington Territory*: 20° at Olympia. *West Virginia*: —21° at *Flemington and —9° at Morgantown. *Wisconsin*: —35° at *Embarrass and —25° at La Crosse. *Wyoming*: —31° at *Ft. Washakie and —24° at Cheyenne.

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Ranges of Temperature at Signal Service Stations.—*Monthly Ranges*, in general varied from 57° to 75° over the country east of the Rocky Mountains. Ranges less than 50° occurred only in New England, southern Florida and on the Pacific slope. The smallest ranges were: San Francisco, 19°, on the Pacific slope; Key West, 31°; Eastport and Punta Rassa, 42°, east of the Rocky Mountains. Ranges exceeding 80° were: Cheyenne, Ft. Buford and North Platte, 84°; Ft. Elliott, Tex., 86°; Helena, 91°; Ft. Assinboine, 95°; Ft. Shaw, 96°; Ft. Custer, 102° and Ft. Benton, 117°. The *daily ranges* varied generally as follows: in New York, New England and the Middle States from 19° to 24°; in the South Atlantic and Gulf States (except northwestern Texas) and in Tennessee from 24° to 31°, in the remaining districts east of the Rocky Mountains from 32° to 42°; on the Pacific coast from 13° to 22°. The *largest ranges* were North Platte, 53°; Fort Davis, 52°; Keokuk and Milwaukee, 47°, Cheyenne, Campo, St. Louis and La Crosse, 46°. The *smallest*, San Francisco and Sacramento, 13°; Brownsville, Tex., 17°; Oswego, 18°; Key West, Wood's Holl, Cape May, Thatcher's Island and New Shoreham, 19°.

Frost.—Frosts were unusually frequent and severe. Those in the Gulf States from the 9th to the 12th and from the 25th to the 31st, were exceedingly severe, that of the end of the month injuring vegetation in Texas even to the mouth of the Rio Grande and on the Florida coast to near Punta Rassa. The only sections *not* visited by frost were southern Florida and the extreme southwestern portion of Arizona; certain sheltered stations in southern California also escaped it.

PRECIPITATION.

The general distribution of rainfall (including melted snow) for December, 1880, is shown on chart No. III, from the reports of over 500 stations. The table on that chart shows the precipitation for the present month as compared with the *average*. The region of greatest rainfall included the Pacific slope northward of central California; on the Atlantic slope the rainfall was heaviest along the coast of New Jersey, Delaware and Virginia. In New England the rainfall continued deficient, except in Maine and Connecticut. The excess in the Middle States was very marked on the coast and gradually diminished towards the interior. In the South Atlantic States the rainfall was especially local. The departures from the means at various stations being: Jacksonville, —1.90 inches; Charleston, —2.48; Cape Lookout, —5.04; Kittyhawk, +0.93; Charleston, +4.52. In the Gulf